MDGrape-3

The world's fastest supercomputer will probably never be known as the world's fastest supercomputer. RIKEN's MDGrape-3 is the first machine to break the petaflop barrier -- that's 1 quadrillion calculations (floating-point operations, to be specific) per second -- and it's three times faster than the currently ranked fastest computer in the world, IBM's BlueGene/L. But MDGrape-3 is so specialized that it can't run the software used to officially rank computing speed. What it can do is determine the effect of any chemical compound on one of the most intricate systems in the human body in a couple of seconds. MDGrape-3 is designed for pharmaceutical research, specifically molecular dynamics simulation. In developing drugs, pharmaceutical companies have to analyze thousands of chemical compounds to find out how they'll affect the protein-bonding structures in the human body. Protein structures called enzymes are the building blocks that do all of the work within a cell, and the way these proteins bond with any drug compound introduced into the human body determines the body's response to that drug. MDGrape-3 produces simulations of these molecular interactions. What takes most computers hours or days to analyze takes MDGrape-3 a few seconds. This functionality is invaluable in drug research, and it could drastically cut the research time involved in the development of new cures. A subsidiary of pharmaceutical giant Merck has already booked time on the machine.

Structurally speaking, MDGrape-3 is a parallel computing system consisting of two main sections: a primary server unit and a specialized-engines unit. The latter component is a cluster of 201 engines running proprietary chips developed by Riken specifically for MDGrape-3. It's this huge set of engines, running 24 MDGrape-3 chips each, that does the heavy protein-analysis lifting. Each chip has a maximum processing speed of 230 gigaflops (one billion operations per second). The primary server unit manages the engine cluster. This parallel server setup runs two different types of processors: 65 servers run dual-core Intel 5000-series Xeon processors, 256 per server; and 37 servers run 3.3-GHz Intel Xeon processors, each with 2 MB of level 1 cache, at 74 processors per server. This hardware structure enables the 1-petaflop speed, which is the machine's theoretical maximum for certain processes.

MDGrape-3 took $9 million and about four years to build. It's actually very efficient -- a total cost of $9 million breaks down to about $15 per gigaflop. The slower BlueGene/L cost about $140 per gigaflop to build. BlueGene/L, which tops out at a theoretical 360 teraflops (trillion calculations per second), is also a biotechnology-specific machine. The advances in speed marked by these two supercomputers is indicative of a general trend in technology toward biologically-slanted systems. Some say the trend really started with the successful mapping of the human genome in 2000. Regardless of what spurred the current biotechnology race, most experts agree that the logical end of the surge is a state of DNA-based medicine. In several decades, we could make an appointment with our doctor for a quick DNA analysis to find out what diseases we're at risk for and pop a single, gene-targeting pill that eliminates all of those foreseeable risks.
For a current answer to this see the TOP500 list which is updated every 6 months.

**Related Answers**
- Which is the fastest supercomputer on earth?
- What country has the fastest supercomputer in the world?
- Name of the world's 2nd fastest supercomputer
- What is supercomputer?
- What are supercomputers?

**Did we answer your question?**

- [ ] Yes
- [ ] No
- [ ] Partially

First answer by Mothra820. Last edit by Eccles-Jordan Trigger

**From around the Web**

- [A Movie So Violent That We Can't Recommend To Normal Viewers](#)
- [Miley Cyrus' VMA Performance Horrifies Fans](#)
- [2012 Films That Deserve a Second Look](#)
- [Celebs You Won't Believe Are Actually Friends](#)
- [Top 5 Old Cartoons That Deserved a Movie](#)

**More on: Computer History**

- **In computer terms what is a nibble?**
  - In computer terms a nibble = 4 bits = 1/2 byte. You can further define the data segment as: Crumb = 2 bits Nibble = 4 bits Byte =... more »
- **Which is the fastest supercomputer on earth?**
  - MDGrape-3The world's fastest supercomputer will probably never be known as the world's fastest supercomputer; RIKEN's MDGrape-3 is the... more »

**Top Articles**

- Most Touching Celebrity Reactions to Cory Monteith's Death
- The 5 Coolest Secret Video Game Characters
- 6 Horror Movie Sets That Were Actually Haunted
- Spoilers: 5 Craziest Movie Plot Twists

**Top Questions**

- What is the scope in computer science engineering and what will it be in four years?
Computer software engineers apply the principles of computer science and mathematical...

Where can you go to sell your dvds?
There are many great sites that buy your dvds or will help you sell your dvds. But there...

What is the history of dark ages of computer?
1st Answer: The computer wasn't invented until 1947 many hundreds of years after the...

Results for Which is the fastest supercomputer on earth:

Mortgage Rates Hit 2.50%
If you owe under $729k you may qualify for 2.90% APR Govt Refi Plans.
www.MortgageRatesExperts.com

The Final Theory
New physics in science bestseller our scientists hope you never read.
thefinaltheory.com

Compare Annuity Rates
Not Generating The Income You Need? See